

SECTION 5.101
GENERAL

5.101.1 Scope. The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

SECTION 5.102
DEFINITIONS

5.102.1 Definitions. The following terms are defined in chapter 2.

CUTOFF LUMINAIRES.

LOW-EMITTING AND FUEL EFFICIENT VEHICLES.

NEIGHBORHOOD ELECTRIC VEHICLE (NEV).

TENANT OCCUPANTS.

VANPOOL VEHICLE.

ZEV.

SECTION 5.103
SITE SELECTION
(Reserved)

SECTION 5.104
SITE PRESERVATION
(Reserved)

SECTION 5.105
DECONSTRUCTION AND REUSE
OF EXISTING STRUCTURES
(Reserved)

SECTION 5.106
SITE DEVELOPMENT

5.106.1 Stormwater pollution prevention for projects that disturb less than one acre of land. Newly constructed projects and additions which disturb less than one acre of land and are not part of a larger common plan of development or sale shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted stormwater management and/or erosion control ordinance.

5.106.1.2 Best management practices (BMP)’s. Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP’s.

- Soil loss BMP’s that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
 - Scheduling construction activity during dry weather, when possible.
 - Preservation of natural features, vegetation, soil, and buffers around surface waters.
 - Drainage swales or lined ditches to control stormwater flow.
 - Mulching or hydroseeding to stabilize disturbed soils.
 - Erosion control to protect slopes.
 - Protection of storm drain inlets (gravel bags or catch basin inserts).
 - Perimeter sediment control (perimeter silt fence, fiber rolls).
 - Sediment trap or sediment basin to retain sediment on site.
 - Stabilized construction exits.
 - Wind erosion control.
 - Other soil loss BMP’s acceptable to the enforcing agency.

- Good housekeeping BMP’s to manage construction equipment, materials, non-stormwater discharges, and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

- a. Dewatering activities.
- b. Material handling and waste management.
- c. Building materials stockpile management.
- d. Management of washout areas (concrete, paints, stucco, etc.).
- e. Control of vehicle/equipment fueling to contractor’s staging area.
- f. Vehicle and equipment cleaning performed off site.
- g. Spill prevention and control.
- h. Other housekeeping BMP’s acceptable to the enforcing agency.

5.106.2 Stormwater pollution prevention for projects that disturb one or more acres of land. Comply with all lawfully enacted stormwater discharge regulations for projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development or sale.

Note: Projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development or sale must comply with the postconstruction requirements detailed in the applicable National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board or the Lahontan Regional Water Quality Control Board (for projects in the Lake Tahoe Hydrologic Unit).

The NPDES permits require postconstruction runoff (post-project hydrology) to match the preconstruction runoff (pre-project hydrology) with the installation of postconstruction stormwater management measures. The NPDES permits emphasize runoff reduction through on-site stormwater use, interception, evapotranspiration, and infiltration through nonstructural controls, such as Low Impact Development (LID) practices, and conservation design measures. Stormwater volume that cannot be addressed using nonstructural practices is required to be captured in structural practices and be approved by the enforcing agency.

Refer to the current applicable permits on the State Water Resources Control Board website at: www.waterboards.ca.gov/construction/stormwater. Consideration to the stormwater runoff management measures should be given during the initial design process for appropriate integration into site development.

5.106.4 Bicycle parking. For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2.

5.106.4.1 Bicycle parking. [BSC-CG] Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors’ entrance, readily visible to passers-by, for 5 percent of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.

Exception: Additions or alterations which add nine or less visitor vehicular parking spaces.

5.106.4.1.2 Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.3. For additions or alterations that add 10 or more tenant-occupant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicular parking spaces being added, with a minimum of one bicycle parking facility.

5.106.4.1.4. For new shell buildings in phased projects provide secure bicycle parking for 5 percent of the anticipated tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.5. Acceptable bicycle parking facility for Sections 5.106.4.1.2, 5.106.4.1.3, and 5.106.4.1.4 shall be convenient from the street and shall meet one of the following:

- Covered, lockable enclosures with permanently anchored racks for bicycles;
- Lockable bicycle rooms with permanently anchored racks; or
- Lockable, permanently anchored bicycle lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

5.106.4.2 Bicycle parking. [DSA-SS] For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2.

5.106.4.2.1 Student bicycle parking. Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.

5.106.4.2.2 Staff bicycle parking. Provide permanent, secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable bicycle parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

- Covered, lockable enclosures with permanently anchored racks for bicycles;
- Lockable bicycle rooms with permanently anchored racks; or
- Lockable, permanently anchored bicycle lockers.

5.106.5.2 Designated parking for clean air vehicles. In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

TABLE 5.106.5.2	
TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0-9	0
10-25	1
26-50	3
51-75	6
76-100	8
101-150	11
151-200	16
201 and over	At least 8 percent of total

5.106.5.2.1 Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle:

CLEAN AIR/
VANPOOL/EV

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

5.106.5.3 Electric vehicle (EV) charging. [N] Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code*, the *California Electrical Code* and as follows:

5.106.5.3.1 Single charging space requirements. [N] When only a single charging space is required per Table 5.106.5.3.3, a racway is required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

- The type and location of the EVSE.
- A listed racway capable of accommodating a 208/240-volt dedicated branch circuit.
- The raceway shall not be less than trade size 1.”
- The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into a listed suitable cabinet, box, enclosure or equivalent.
- The service panel or subpanel shall have sufficient capacity to accommodate a minimum 40-ampere dedicated branch circuit for the future installation of the EVSE.

5.106.5.3.2 Multiple charging space requirements. [N] When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the *California Electrical Code*. Construction plans and specifications shall include, but are not limited to, the following:

- The type and location of the EVSE.
- The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
- Plan design shall be based upon 40-ampere minimum branch circuits.
- Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
- The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

5.106.5.3.3 EV charging space calculation. [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

Exceptions: On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

- Where there is insufficient electrical supply.

- The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
- Plan design shall be based upon 40-ampere minimum branch circuits.
- Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
- The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

5.106.5.3.3 EV charging space calculation. [N] Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

Exceptions: On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

- Where there is insufficient electrical supply.
- Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

TABLE 5.106.5.3.3	
TOTAL NUMBER OF ACTUAL PARKING SPACES	NUMBER OF REQUIRED EV CHARGING SPACES
0-9	0
10-25	1
26-50	2
51-75	4
76-100	5
101-150	7
151-200	10
201 and over	6 percent of total ¹

1. Calculation for spaces shall be rounded up to the nearest whole number.

5.106.5.3.4 [N] Identification. The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as “EV CAPABLE”. The raceway termination location shall be permanently and visibly marked as “EV CAPABLE”.

5.106.5.3.5 [N] Future charging spaces. Future charging spaces qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.

5.106.8 Light pollution reduction. [N] Outdoor lighting systems shall be designed and installed to comply with the following:

- The minimum requirements in the *California Energy Code* for Lighting Zones 0-4 as defined in Chapter 10, Section 10-114 of the *California Administrative Code*; and
- Backlight (B) ratings as defined in IES TM-15-11 (shown in Table A-1 in Chapter 8);
- Uplight and Glare ratings as defined in *California Energy Code* (shown in Tables 130.2-A and 130.2-B in Chapter 8) and
- Allowable BUG ratings not exceeding those shown in Table 5.106.8 [N], or

Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

Exceptions: [N]

- Luminaires that qualify as exceptions in Section 140.7 of the *California Energy Code*.
- Emergency lighting.
- Building facade meeting the requirements in Table 140.7-B of the *California Energy Code*, Part 6.
- Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.

Notes:

- [N] See also *California Building Code*, Chapter 12, Section 1205.7 for college campus lighting requirements for parking facilities and walkways.
- Refer to Chapter 8 (Compliance Forms, Worksheets and Reference Material) for IES TM-15-11 Table A-1, *California Energy Code* Tables 130.2-A and 130.2-B.
- Refer to the *California Energy Code* for requirements for additions and alterations.

5.106.10 Grading and paving. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

- Swales.
- Water collection and disposal systems.
- French drains.
- Water retention gardens.
- Other water measures which keep surface water away from buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS ^{1,2}					
ALLOWABLE RATING	LIGHTING ZONE L20	LIGHTING ZONE L21	LIGHTING ZONE L22	LIGHTING ZONE L23	LIGHTING ZONE L24
Maximum Allowable Backlight Rating³ (B)					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
Maximum Allowable Uplight Rating (U)					
For area lighting ⁴	N/A	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	N/A	U1	U2	U3	U4
Maximum Allowable Glare Rating⁵ (G)					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	N/A	G0	G0	G1	G1
Luminaire front hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U-Value limits for “all other outdoor lighting.”

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

5.106.12 Shade trees. [DSA-SS] Shade trees shall be planted to comply with Sections 5.106.12.1, 5.106.12.2, and 5.106.12.3. Percentages shown shall be measured at noon on the summer solstice. Landscape irrigation necessary to establish and maintain tree health shall comply with Section 5.304.6.

5.106.12.1 Surface parking areas. Shade tree plantings, minimum #10 container size or equal, shall be installed to provide shade over 50 percent of the parking area within 15 years.

Exceptions: The surface parking area covered by solar photovoltaic shade structures, or shade structures, with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

5.106.12.2 Landscape areas. Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade of 20% of the landscape area within 15 years.

Exception: Playfields for organized sport activity are not included in the total area calculation.

5.106.12.3 Hardscape areas. Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade over 20 percent of the hardscape area within 15 years.

Exception: Walks, hardscape areas covered by solar photovoltaic shade structures, and hardscape areas covered by shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5, are not included in the total area calculation.

Division 5.2 – ENERGY EFFICIENCY

SECTION 5.201
GENERAL

5.201.1 Scope. California Energy Code. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

Division 5.3 – WATER EFFICIENCY AND CONSERVATION

SECTION 5.301
GENERAL

5.301.1 Scope. The provisions of this chapter shall establish the means of conserving water used indoors, outdoors and in wastewater conveyance.

SECTION 5.302
DEFINITIONS

5.302.1 Definitions. The following terms are defined in Chapter 2.

CONSTRUCTION SITE.

DISINFECTED TERTIARY RECYCLED WATER.

EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAf). [DSA-SS]

FOOTPRINT AREA [DSA-SS]

GRAYWATER.

METERING FAUCET.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWEO).

POTABLE WATER.

RECLAIMED (RECYCLED) WATER.

RECYCLED WATER.

RECYCLED WATER SUPPLY SYSTEM.

SPECIAL LANDSCAPE AREA (SLA). [DSA-SS]

SUBMETER.

SECTION 5.303
INDOOR WATER USE

5.303.1 Meters. Separate submeters or metering devices shall be installed for the uses described in Sections 5.303.1.1 and 5.303.1.2.

5.303.1.1 New buildings or additions in excess of 50,000 square feet. Separate submeters shall be installed as follows:

- For each individual leased, rented, or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
- Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:
 - Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).
 - Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s).
 - Steam and hot-water boilers with energy input more than 500,000 Btu/h (147 kW).

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS ^{1,2}					
ALLOWABLE RATING	LIGHTING ZONE L20	LIGHTING ZONE L21	LIGHTING ZONE L22	LIGHTING ZONE L23	LIGHTING ZONE L24
Maximum Allowable Backlight Rating³ (B)					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
Maximum Allowable Uplight Rating (U)					
For area lighting ⁴	N/A	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	N/A	U1	U2	U3	U4
Maximum Allowable Glare Rating⁵ (G)					
Luminaire greater than 2 MH from property line	N/A	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	N/A	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	N/A	G0	G0	G1	G1
Luminaire front hemisphere is less than 0.5 MH from property line	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U-Value limits for “all other outdoor lighting.”

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

5.303.2 Reserved.

5.303.3 Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.3.1 Water closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals.

5.303.3.2.1 Wall-mounted urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush.

5.303.3.2.2 Floor-mounted urinals. The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush.

5.303.3.3 Showerheads.

5.303.3.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.

5.303.3.4 Faucets and fountains.

5.303.3.4.1 Nonresidential lavatory faucets. Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

5.303.3.4.2 Kitchen faucets. Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute/20 [rim space (inches) at 60 psi].

5.303.3.4.4 Metering faucets. Metering faucets shall not deliver more than 0.20 gallons per cycle.

5.303.3.4.5 Metering faucets for wash fountains. Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per cycle/ 20 [rim space (inches) at 60 psi].

Exceptions:

- Unconditioned warehouses of any size.
- Areas less than 10,000 square feet used for offices or other conditioned accessory spaces within unconditioned warehouses.
- Tenant improvements less than 10,000 square feet as described in Section 303.1.1.
- Open parking garages of any size, or open parking garage areas, of any size, within a structure.

Note: For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and/or air conditioning.

Informational Notes:

- IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel. AC 476 does not certify individuals to conduct functional performance tests or to adjust and balance systems.
- Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.
- 5.410.2.1 Owner's or Owner representative's Project Requirements (OPR).** [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:
 - Environmental and sustainability goals.
 - Building sustainable goals.
 - Indoor environmental quality requirements.
 - Project program, including facility functions and hours of operation, and need for after hours operation.
 - Equipment and systems expectations.
 - Building occupant and operation and maintenance (O&M) personnel expectations.

5.410.2.2 Basis of Design (BOD). [N] A written explanation of how the design of the building's systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

- Renewable energy systems.
- Landscape irrigation systems.
- Water reuse systems.

5.410.2.3 Commissioning plan. [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

- General project information.
- Commissioning goals.
- Systems to be commissioned. Plans to test systems and components shall include:
 - An explanation of the original design intent.
 - Equipment and systems to be tested, including the extent of tests.
- Functions to be tested.
- Conditions under which the test shall be performed.
- Measurable criteria for acceptable performance.
- Commissioning team information.
- Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

5.410.2.4 Functional performance testing. [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

5.410.2.5 Documentation and training. [N] A systems manual and systems operations training are required, including Occupational Safety and Health Act (OSHA) requirements in *California Code of Regulations* (CCR), Title 8, Section 5142, and other related regulations.

5.410.2.5.1 Systems manual. [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

- Site information, including facility description, history and current requirements.
- Site contact information.
- Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
- Major systems.
- Site equipment inventory and maintenance notes.
- A copy of verifications required by the enforcing agency or this code.
- Other resources and documentation, if applicable.

5.410.2.5.2 Systems operations training. [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:

- System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).
- Review and demonstration of servicing/preventive maintenance.
- Review of the information in the systems manual.
- Review of the record drawings on the system/equipment.

5.410.2.6 Commissioning report. [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

5.410.4 Testing and adjusting. New buildings less than 10,000 square feet. Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.1 (Reserved)

Note: For energy-related systems under the scope (Section 100) of the *California Energy Code*, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting system and controls, as well as water heating systems and controls, refer to *California Energy Code* Section 120.8 for commissioning requirements and Sections 120.5, 120.6, 130.4, and 140.9(b)3 for additional testing requirements of specific systems.

5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include, as applicable to the project:

- Renewable energy systems.
- Landscape irrigation systems.
- Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, balance the system in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

5.410.4.5 Operation and maintenance (O & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guarantees/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

Division 5.5 – ENVIRONMENTAL QUALITY

SECTION 5.501

GENERAL

5.501.1 Scope. The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

SECTION 5.502

DEFINITIONS

5.502.1 Definitions. The following terms are defined in Chapter 2.

ARTERIAL HIGHWAY.

A-WEIGHTED SOUND LEVEL (dBA).

1 BTU/HOUR.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL).

COMPOSITE WOOD PRODUCTS.

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn).

DECIBEL (dB).

ENERGY EQUIVALENT (NOISE) LEVEL (L_{eq}).

EXPRESSWAY.

FREEWAY.

GLOBAL WARMING POTENTIAL (GWP).

GLOBAL WARMING POTENTIAL VALUE (GWP VALUE).

HIGH-GWP REFRIGERANT.

LONG RADIUS ELBOW.

LOW-GWP REFRIGERANT.

MERV.

MAXIMUM INCREMENTAL REACTIVITY (MIR).

PRODUCT-WEIGHTED MIR (PWMIR).

PSIG.

REACTIVE ORGANIC COMPOUND (ROC).

SCHRADER ACCESS VALVES.

SHORT RADIUS ELBOW.

SUPERMARKET.

VOC.

SECTION 5.503

FIREPLACES

5.503.1 Fireplaces. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed wood-stove or pellet stove, and refer to residential requirements in the *California Energy Code*, Title 24, Part 6, Subchapter 7, Section 130. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstove and pellet stoves shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

SECTION 5.504

POLLUTANT CONTROL

5.504.1 Temporary ventilation. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. Cool time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

- Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

- Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

TABLE 5.504.4.1
ADHESIVE VOC LIMIT^{1,2}

Less Water and Less Exempt Compounds in Grams Per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
SPECIALTY APPLICATIONS	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
SUBSTRATE SPECIFIC APPLICATIONS	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

- If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.
- For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

TABLE 5.504.4.2
SEALANT VOC LIMIT

SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
SEALANT PRIMERS	
Architectural	250
Nonporous	775
Porous	750
Modified bituminous	500
Marine deck	760
Other	750

Note: For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

- Manufacturer's product specification
- Field verification of on-site product containers

TABLE 5.504.4.3
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS^{1,2}

COATING CATEGORY	CURRENT LIMIT
Grams of VOC per Liter of Coating	
Less Water and Less Exempt Compounds	
Flat coatings	50
Nonflat coatings	100
Nonflat-high gloss coatings	150
SPECIALTY COATINGS	
Aluminum roof coatings	400
Basement specialty coatings	400
Bituminous roof coatings	50
Bituminous roof primers	350
Bond breakers	350
Concrete curing compounds	350
Concrete/masonry sealers	100
Driveway sealers	50
Dry fog coatings	150
Faux finishing coatings	350
Fire resistive coatings	350
Floor coatings	100
Form-release compounds	250
Graphic arts coatings (sign paints)	500
High temperature coatings	420
Industrial maintenance coatings	250
Low solids coatings ¹	120
Magnetite cement coatings	450
Mastic texture coatings	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pre-treatment wash primers	420
Primers, sealers, and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50

Rust preventative coatings	250
Shallacs	
Clear	730
Opaque	550
Specialty primers, sealers and undercoaters	100
Stains	250
Stone consolidants	450
Swimming pool coatings	340
Traffic marking coatings	100
Tab and tile refinish coatings	420
Waterproofing membranes	250
Wood coatings	275
Wood preservatives	350
Zinc-rich primers	340

- Grams of VOC per liter of coating, including water and including exempt compounds.
- The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
- Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.

5.504.4.4 Carpet systems. All carpet installed in the building interior shall meet at least one of the following testing and product requirements:

- Carpet and Rug Institute's Green Label Plus Program;
- Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1-1 or *Specification 01350*);
- NSF/ANSI 140 at the Gold level or higher;
- Scientific Certifications Systems Sustainable Choice; or
- Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database.

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute's Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.) Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

TABLE 5.504.4.5 FORMALDEHYDE LIMITS ¹ Maximum Formaldehyde Emissions in Parts per Million	
PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard ²	0.13

- Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333. For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.
- Thin medium density fiberboard has a maximum thickness of ¹/₁₆ inch (8 mm).

5.504.4.5.1 Early compliance. Reserved.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

- Product certifications and specifications.
- Chain of custody certifications.
- Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, *et seq.*).
- Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
- Other methods acceptable to the enforcing agency.

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

- Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
- Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
- Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
- Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exception: Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

5.504.7 Environmental tobacco smoke (ETS) control. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

SECTION 5.505

INDOOR MOISTURE CONTROL

5.505.1 Indoor moisture control. Buildings shall meet or exceed the provisions of *California Building Code*, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures, see Section 5.407.2 of this code.

SECTION 5.506

INDOOR AIR QUALITY

5.506.1 Outside air delivery. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

5.506.2 Carbon dioxide (CO2) monitoring. For buildings or additions equipped with demand control ventilation, CO2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the *California Energy Code*, Section 120.1(c)(4).

SECTION 5.507

ENVIRONMENTAL COMFORT

5.507.4 Acoustical control. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E90 and ASTM E413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception: [DSA-SS] For public schools and community colleges, the requirements of this section and all subsections apply only to new construction.

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

- Within the 65 CNEL noise contour of an airport.

Exceptions:

- L_{eq} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
- L_{eq} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.
- Within the 65 CNEL or L_{eq} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq}(1-hr) during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq}(1-hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: http://www.toolbase.org/PDF/CaseStudies/stc_ccc_ratings.pdf.

SECTION 5.508

OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

5.508.1.1 Chlorofluorocarbons (CFCs). Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.508.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and the replacement of existing refriger